

Rocks and Minerals C - Rocks and Minerals - BirdSO C 2021 Invitational - 03-07-2021**Instructions** (shown before students start the test)**Welcome to the 2021 BirdSO Rocks and Minerals C Exam!**

This test is in station format but due to the virtual nature of the test you will be able to complete questions from any part of the test anytime you'd like. I suggest that you spend 2 and a half minutes on each station before moving on so you can finish as many of the 20 stations as possible. It is designed to be a long test so move on to another question if you are stuck. For identification please write them in the following format: A. Calcite B. Copper C. Fluorite etc. I will not penalize you for not following this format but it will make it very clear for grading and avoid possible mix-ups with your answers. Most of the specimens are from the national list and all specimens are pieces from my own personal collection. There may be specimens that are not on the list, but for those, you do not need to identify them; read the directions carefully at each station since they tell you which ones to identify. Some specimens MAY be used more than once. I will also not penalize spelling, as long as I know which rock/mineral you're referring to you will get credit. There will be no partial credit for multiple-choice questions, or short answer questions worth 2 points.

Introduction (shown after students start the test)

This test is composed of 145 questions with varying difficulty and is out of a total of 220 points. All individual mineral identification is worth 2 points, easy questions are worth 1 point, an harder questions are worth 2 points. Be sure to read the directions CAREFULLY at each station. The tiebreakers in order are as follows: station 13, station 9, station 4, station 7. Good luck!

1. (6.00 pts) Station 1: Identify A-C

A.



B.



C.



2. (1.00 pts) What is the streak color of mineral A?

- A) Black
- B) Red
- C) Silver
- D) White
- E) Golden

3. (1.00 pts) Which mineral is used for drilling mud?

- A) A
- B) B
- C) C

4. (1.00 pts) What element is specimen C an ore for?

- A) Strontium
- B) Sodium
- C) Nickel
- D) Antimony
- E) Zinc

5. (1.00 pts) What color fireworks are produced from fireworks that are created from the ore of specimen C?

- A) Green
- B) Yellow
- C) Red
- D) Blue
- E) White

6. (1.00 pts) Two of these specimens belong to which group?

- A) Silicates
- B) Sulfates
- C) Oxides
- D) Carbonates
- E) Sulfides

7. (6.00 pts) Station 2: Identify A-C

A. (Hint its purple)



B.



C. (Hint: smells like rotten eggs when scratched on ceramic plate)



8. (1.00 pts) What element is specimen A an ore of?

- A) Aluminum
- B) Cobalt
- C) Boron
- D) Beryllium
- E) Lithium

9. (1.00 pts) What element is specimen B an ore of?

- A) Zinc
- B) Iron
- C) Copper
- D) Lithium
- E) Tin

10. (1.00 pts) What element is specimen C an ore of?

- A) Iron
- B) Zinc
- C) Nickel
- D) Sulfur
- E) Copper

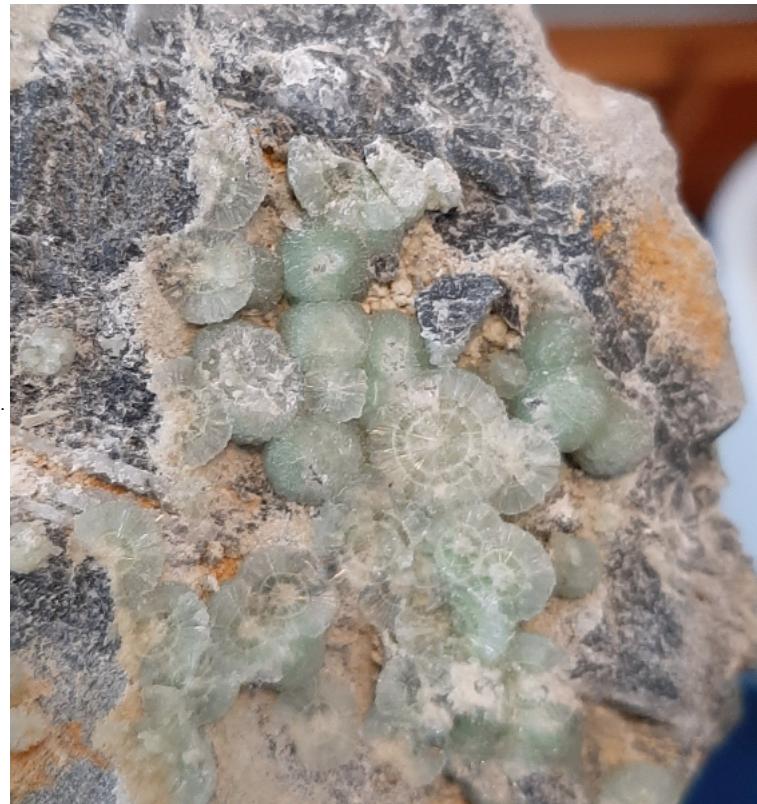
11. (2.00 pts) Select all false statements

(Mark **ALL** correct answers)

- A) Specimen B is commonly mined in The Congo
- B) Specimen C can have up to 4 directions of cleavage in a given sample
- C) Specimen A has basal cleavage
- D) Specimen C's name is derived from the Latin word for "treacherous"
- E) Specimen A cannot be found in igneous rocks such as pegmatite

12. (2.00 pts) Station 3: Identify ONLY Specimen A





C.



D.



13. (1.00 pts) What is the crystal habit of specimen A?

- A) Botryoidal
- B) Desert Rose
- C) Oolitic
- D) Stalactitic
- E) Coxcomb

14. (1.00 pts) What is the crystal habit for specimen B?

- A) Reniform
- B) Tabular
- C) Radiating
- D) Acicular
- E) Dendritic

15. (1.00 pts) What is the crystal habit of specimen C?

- A) Tabular
- B) Radiating
- C) Botryoidal

- D) Equant
- E) Fibrous

16. (1.00 pts) What is the crystal habit of specimen D?

- A) Massive
- B) Reniform
- C) Acicular
- D) Druse
- E) Mammillary

17. (2.00 pts) Select all true statements

(Mark **ALL** correct answers)

- A) Specimen A's name is derived from the Greek word for "moon"
- B) Specimen A can be dehydrated
- C) Specimen A has a triclinic crystal system
- D) It cannot be scratched by a fingernail
- E) The removal of calcium from its chemical equation creates the specific crystal habit in specimen A

18. (2.00 pts) Briefly describe the difference between contact and penetration twinning.

19. (1.00 pts) State one factor that can affect a mineral's crystal habit.

20. (8.00 pts) Station 4: Identify A-D

A.



B.



C.



D.



21. (1.00 pts) Which specimen took the longest to form?

- A) A
- B) B
- C) C

○ D) D

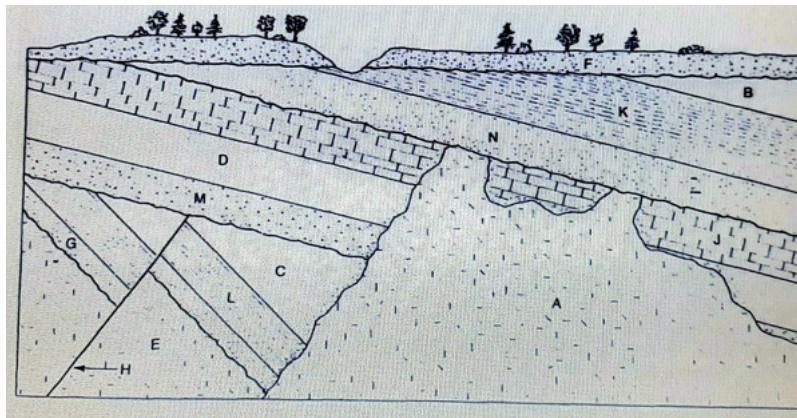
22. (2.00 pts) Which specimen(s) are considered plutonic?

(Mark **ALL** correct answers)

- A) A
 - B) B
 - C) C
 - D) D

23. (6.00 pts) Station 5: No specimens

1. Put the layers in order from oldest to youngest. There are 13 layers. In case it is hard to find layer J is on the right side.



24. (1.00 pts) Briefly define "xenolith".

25. (2.00 pts) Select all of the minerals that CANNOT be in granite.

(Mark **ALL** correct answers)

- A) Potassium Feldspar
 - B) Plagioclase Feldspar
 - C) Olivine
 - D) Pyroxene
 - E) Amphibole

26. (1.00 pts) According to Bowen's reaction series which series can biotite be found on?

- A) Continuous
- B) Discontinuous

27. (1.00 pts) Which group of feldspar forms at a higher temperature?

- A) Calcium rich feldspar
- B) Sodium rich feldspar

28. (6.00 pts) Station 6: Identify Rocks A-C

A.



B.



C.



29. (1.00 pts) A geologist finds a large boulder of rock B and a large boulder of rock C. Which rock would a geologic hammer and chisel be most effective for splitting?

- A) Rock B
- B) Rock C

30. (1.00 pts) What is the size range of the compacted sediments for rock B?

- A) Less than 0.0004 cm
- B) 0.0004-0.006 cm
- C) 0.006-0.2 cm
- D) 0.2-6.4 cm
- E) Greater than 6.4 cm

31. (1.00 pts) What environment did specimen A most likely come from?

- A) High energy stream channel
- B) Low energy stream channel
- C) Floodplain
- D) Shallow marine shelf
- E) Deep marine

32. (1.00 pts) Which rock would react the strongest with HCl? (Everyone was given credit because "with HCl" was left out of the question)

- A) A
- B) B
- C) C

33. (1.00 pts) Rock C contains a Herkimer Diamond. State what characteristic makes a quartz crystal considered a Herkimer Diamond.

34. (4.00 pts) Station 7: Identify Rocks A-B

A.



B.



C.



35. (1.00 pts) What environment was rock A most likely found in?

- A) Floodplain
- B) Beach
- C) Reef
- D) Swamp
- E) Desert Dune

36. (1.00 pts) Which classification fits rock B most appropriately?

- A) Clastic
- B) Felsic
- C) Biochemical
- D) Coarse
- E) Chemical

37. (1.00 pts) Rock B can form in multiple ways. Explain one of them.

38. (2.00 pts)

A geologist splits a rather large boulder in a Devonian rock layer where they find rock C (mud cracks). Explain how they form and list a possible environment the geologist was searching in.

39. (2.00 pts) Select all true statements.

(Mark **ALL** correct answers)

- A) Rock A was deposited in a low energy environment
- B) Common usage of rock B is for making arrowheads
- C) Mud cracks cannot be found in an arid environment
- D) Sandstones are typically composed of smaller particles than rock B
- E) When rock B is struck against an iron-bearing surface it will spark

40. (4.00 pts) Station 8: Identify Rocks A-B

A.



B.



41. (1.00 pts) Define foliation.

42. (2.00 pts) Which of the following rocks have foliation?

(Mark **ALL** correct answers)

- A) Schist
- B) Phyllite
- C) Gneiss
- D) Marble
- E) Slate

43. (1.00 pts) All banding is foliation, but not all foliation is banding.

- True
- False

44. (1.00 pts) Which of the following correctly puts the rocks in order of increasing grades of metamorphism?

- A) Phyllite, Slate, Gneiss, Schist
- B) Slate, Schist, Phyllite, Gneiss
- C) Schist, Phyllite, Slate, Gneiss
- D) Slate, Phyllite, Schist, Gneiss
- E) Gneiss, Phyllite, Slate, Schist

45. (2.00 pts) Explain the difference between regional and contact metamorphism.

46. (6.00 pts) Station 9: Identify A-C

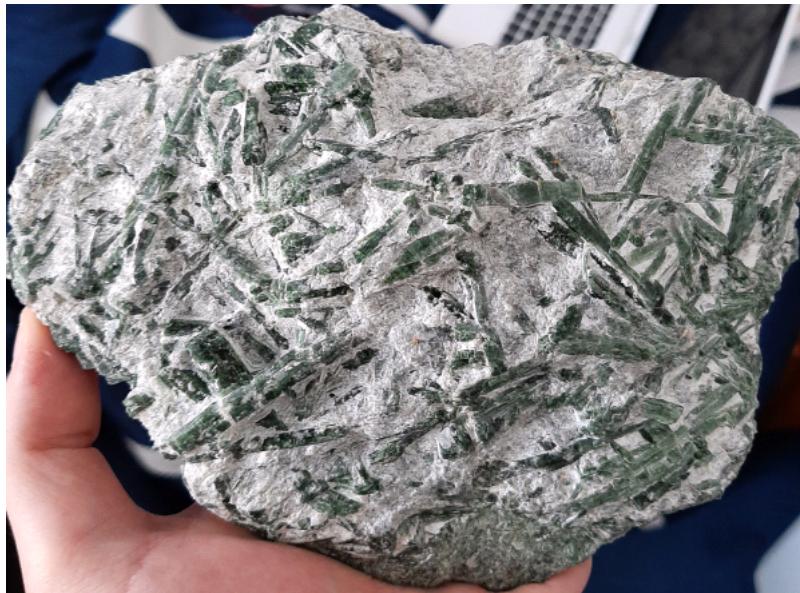
A.



B.



C.



47. (1.00 pts) How many directions of cleavage does specimen A have?

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4

48. (1.00 pts) How many directions of cleavage does specimen B have?

- A) 0
- B) 1
- C) 2
- D) 3
- E) 4

49. (2.00 pts) Select the mineral(s) that specimen C related to.

(Mark **ALL** correct answers)

- A) Specimen A
- B) Specimen B
- C) Spodumene
- D) Tremolite
- E) Asbestos

50. (1.00 pts) Which is an official nickname for one of the specimens at this station?

- A) Iceland spar
- B) Fibrous Green Lantern
- C) Iron cube
- D) Amphibole ore
- E) Coconut Mall

51. (6.00 pts) Station 10: Identify A-C

A.



B.



C.



52. (1.00 pts) What is the hardness of specimen A?

- A) 2
- B) 3
- C) 4
- D) 5
- E) 6

53. (1.00 pts) A certain igneous rock containing a UV reactive form of specimen B is known as what?

- A) Yooperlite
- B) Hardystonite
- C) Scapolite
- D) Phosphophyllite
- E) Hyalite

54. (1.00 pts) What is the language of origin for specimen A?

- A) Chinese
- B) Greek
- C) Polish
- D) Latin
- E) Japanese

55. (2.00 pts) Select all true statements.

(Mark ALL correct answers)

- A) Specimen C has a pyroelectric property
- B) Specimen A's name means "to flow"
- C) Specimen B has a variety that exhibits a reversible photochromism property
- D) Specimen C can be found in pegmatites
- E) Schorl, Elbaite, and Rubellite are varieties of Specimen C

56. (8.00 pts) Station 11: Identify A-D

A.



B.



C.



D.



57. (1.00 pts) Which specimen(s) is not a silicate?

(Mark **ALL** correct answers)

- A) A
- B) B
- C) C
- D) D

58. (1.00 pts) What element determines specimen C's characteristics such as color and specific gravity?

- A) Iron
- B) Calcium
- C) Silicon
- D) Aluminum

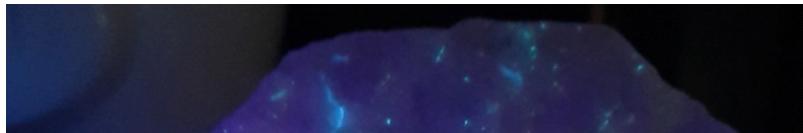
59. (1.00 pts) Specimen D is the state mineral of which state?

- A) Arkansas
- B) Georgia
- C) Alabama
- D) Mississippi

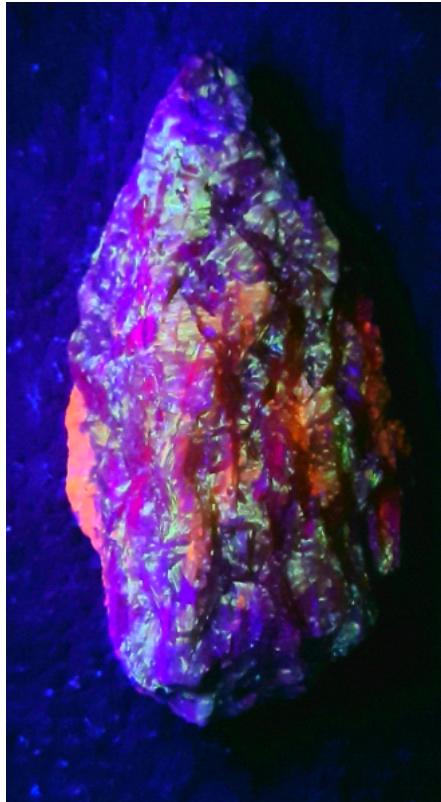
60. (4.00 pts)

Station 12: Identify A-B (All specimens have a picture under a UV light and one under sunlight next to or below it.)

A.



B.



C.



61. (2.00 pts) Explain how the UV light causes these minerals to fluoresce.

62. (1.00 pts) Specimen B is a metamorphic mineral.

- True False

63. (1.00 pts)

Specimen C is Willemite. It fluoresces best under shortwave UV light but can still fluoresce the same color under long-wave UV light. Does this apply to all fluorescent minerals?

- A) Yes
- B) No

64. (1.00 pts) Which specimen is able to scratch the other?

- A) A
- B) B

65. (2.00 pts) Select all true statements.

(Mark ALL correct answers)

- A) Specimen A only exists as a white color
- B) Specimen B has a monoclinic crystal system
- C) Specimen A is a sulfate
- D) Specimen B is fibrous
- E) Other varieties of specimen A can fluoresce green.

66. (8.00 pts) Station 13: Identify A-D

A.

B.

C.



D.

67. (2.00 pts) Name and explain the property that makes this variety of minerals useful in products such as clocks.

68. (1.00 pts) What is the crystal system for all of these minerals?

- A) Monoclinic
- B) Trigonal
- C) Hexagonal
- D) Triclinic

69. (8.00 pts) Station 14: Identify A-D

A.

B.



C.



D.



70. (1.00 pts) Which specimen is useful for radiometric dating?

- A) A
- B) B
- C) C
- D) D

71. (1.00 pts) Which specimen can be used to help buffer pH changes in saltwater aquariums?

- A) A
- B) B
- C) C
- D) D

72. (1.00 pts) Which specimen can be either an igneous or metamorphic mineral?

- A) A
- B) B
- C) C
- D) D

73. (6.00 pts) Station 15: Identify A-C

A. (Hint: does NOT have a golden inside)

B.

C.

74. (1.00 pts) What is the nickname for specimen A?

75. (1.00 pts) What element do specimens B and C have that differs them from other varieties in their group?

- A) Potassium
- B) Sodium
- C) Calcium
- D) Aluminum
- E) Iron

76. (1.00 pts) What element is specimen A an ore of?

- A) Nickel
- B) Iron
- C) Copper
- D) Sodium
- E) Vanadium

77. (2.00 pts) Select all false statements.

(Mark **ALL** correct answers)

- A) Specimen B will be scratched by a copper nail
- B) Specimen A is the state mineral of Arizona
- C) It was originally believed that copper gave specimen A its color
- D) Specimen B is harder than specimen A
- E) Specimen C is not primarily used as an ore

78. (6.00 pts) Station 16: Identify A-C

A. (Hint: red-brown streak)

B.

C.

79. (1.00 pts) Which specimen has a polymorph?

- A) A
- B) B
- C) C

80. (2.00 pts) Explain the difference between a polymorph and a pseudomorph.**81. (1.00 pts)** List a pair of minerals that are pseudomorphs of each other from the national list.**82. (1.00 pts)** Which specimen has a unique optical property?

- A) A
- B) B
- C) C
- D) None

83. (6.00 pts) Station 17: Identify A-C

A.

B.

C.

84. (1.00 pts) What is the source of the pink color in specimen A?

- A) Manganese
- B) Calcium
- C) Copper
- D) Bacteria
- E) Cobalt

85. (1.00 pts) Which specimen is unstable in air?

- A) A
- B) B
- C) C

86. (2.00 pts) List two uses for specimen A.

87. (1.00 pts) There is more than one carbonate specimen at this station.

- True
- False

88. (1.00 pts) Station 18: Fast Facts

What is the state mineral of New Jersey?

- A) Franklinite
- B) Willemite
- C) Calcite
- D) Fluorite
- E) Wollastonite

89. (1.00 pts) Bauxite is an ore of what element?

- A) Zinc
- B) Aluminum
- C) Beryllium
- D) Iron

- E) Copper

90. (1.00 pts) Explain why Opal is considered a mineraloid.

91. (1.00 pts) Pyrolusite has been found in large quantities at Neanderthal sites.

- True False

92. (2.00 pts) Select all true statements.

(Mark ALL correct answers)

- A) Galena and sphalerite are both sulfates
 B) Talc is the softest mineral on Moh's hardness scale
 C) Lignite is the lowest rank of coal
 D) Scoria can float in water because of its porous texture
 E) A mountain range in South America is named after Andesite

93. (2.00 pts) Select all true statements.

(Mark ALL correct answers)

- A) Muscovite used to be used in toasters
 B) Goethite can have a yellow-brown streak
 C) Diatoms are single celled carbonate organisms that compose diatomite
 D) Diamonds are typically found in kimberlites
 E) Corundum has a hexagonal crystal system

94. (1.00 pts) Kaolinite has a Chinese language of origin

- True False

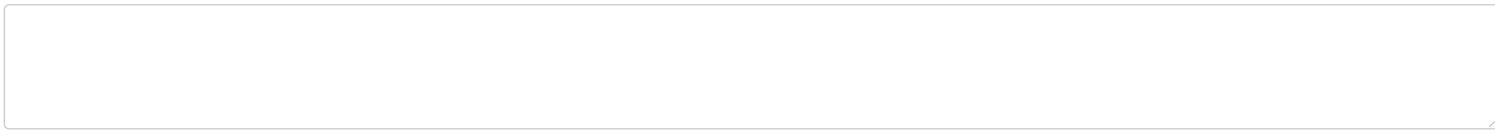
95. (1.00 pts) Which of the following rocks is the most mafic?

- A) Granite
 B) Gabbro
 C) Andesite
 D) Obsidian
 E) Rhyolite

96. (1.00 pts) Arkose can be found in alluvial fans.

True False

97. (6.00 pts) Station 19: Identify B-D on the rock cycle diagram.



98. (1.00 pts) Which of the following could be a possible rock for letter D?

- A) Granite
- B) Pegmatite
- C) Phyllite
- D) Shale
- E) Gabbro

99. (2.00 pts) Select all true statements.

(Mark **ALL** correct answers)

- A) Erosion is necessary for the formation of a sedimentary rock
- B) Granite generally has larger crystals than basalt
- C) Igneous rocks are most useful for radiometric dating
- D) Magma can form a metamorphic rock if it cools fast enough
- E) Sedimentary rocks must be at least 3 years old to be considered a rock and no longer sediments

100. (1.00 pts) Extreme heat and pressure are required to form conglomerate and breccia.

True False

101. (1.00 pts) The best coal to use for fuel is Bituminous Coal.

True False

102. (6.00 pts) Station 20: Identify A-C

A.

B. (Hint: slight fizz in HCl)

C.

103. (1.00 pts) Which is true about specimen A?

- A) Its primary use is an ore of Aluminum
- B) It has a different hardness across perpendicular axis's
- C) It is a sulfate
- D) It has a trigonal crystal system
- E) It has a blue streak color

104. (1.00 pts) Which specimen has the Sweet Home Mine in Alma Colorado as the primary producer for the majority of the world's specimens?

- A) A
- B) B
- C) C
- D) None
- E) Two of these

105. (1.00 pts) Which specimen is considered a Zeolite?

- A) A
- B) B
- C) C
- D) None
- E) Two of these

106. (1.00 pts) Specimen B is extremely expensive compared to the other specimen at this station.

- True
- False

107. (1.00 pts) Which specimen often forms alongside apophyllite?

- A) A
- B) B
- C) C
- D) None
- E) Two of these

Thank you for taking my test! This was my first time being an event supervisor so I would really appreciate it if you took 2 minutes to provide some feedback on this google form: Google form (https://docs.google.com/forms/d/e/1FAIpQLSep3l8VkJHqxCZYFdV2McRfGF_UJsCzNpn-ZjwDxC_Xg/viewform?usp=sf_link)

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